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November-December 1990

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COVER: She's back! The old hospital ship *Sanctuary* (AH-17) sits in the Port of Baltimore undergoing restoration. Salvaged from mothballs, *Sanctuary* will soon operate as a floating teaching hospital for Third World countries. Story on page 2. Photo by editor.

A Continuing Commitment to GME

Graduate medical education (GME) remains a key element of the Navy Medical Department. Its importance goes beyond the professional growth needs of our officers. GME programs are necessary to ensure that the Navy maintains a continuous supply of specialists to provide secondary and tertiary care for all our beneficiaries. The importance of GME is now being demonstrated during the contingency response and Reserve mobilization for Operation Desert Shield, as we maintain our training programs at full strength in recognition of the importance of tertiary hospital casualty care, as well as ensuring that Navy medicine will not lose its specialty capabilities at any time in the future.

We have nearly 600 training positions for interns, residents, and fellows available in Navy facilities, mostly at our nine teaching hospitals (four multidisciplinary and five family practice) and the Naval Aerospace Medical Institute in Pensacola, FL. Virtually the full range of specialties and subspecialties are covered at our facilities through full-time inservice training (FTIS). GME can also be obtained through full-time outservice training (FTOS) and training through other federal institutions. Each year, the Graduate Medical Education Selection Board nominates approximately 300 general medical officers for FTIS programs. Our general medical officer (GMO) pool is our best and preferred source of input for graduate medical education.

This year's GME selection board met in October, and I was once again impressed by the extremely high quality of the officers we reviewed. However, I was disappointed with the low number of applicants from the fleet, especially for the primary care specialties. This year, as in years past, the board gave priority to those officers who were completing a utilization or operational tour. And, as in years past, there were not enough applicants from the fleet to fill available positions.

While GME is important, I consider experience with the fleet or Marines an integral part of a Navy medical officer's career path. It is vital that we staff the fleet and Fleet Marine Forces, particularly in this time of heightened tensions. The same pool of interns which provides general medical officers to serve with the fleet and Fleet Marine Force cannot simultaneously be a major source of GME students.

To make the prerequisite operational or utilization tour feasible, we must have enough physicians available to go to op/ut billets, and we need enough fleet GMOs to apply for GME for us to fill our programs. A significant increase in the number of Armed Forces Health Professional Scholarship Program students graduating from medical school will occur in 1991. This, combined with increased successes in recruiting and retention, will make us healthy in 1992 and beyond.

While some GME positions may remain vacant this year in order to meet our operational commitments, we have no plans to decrease the number of GME positions or programs. Do not be concerned about GME program reductions in light of federal budget crises and organizational changes within Navy medicine. You should know that the GME program, started after World War II, has always guaranteed complete training to the point of board eligibility even when MTFs have been phased out, by transferring residents to other FTIS or FTOS programs. No resident or fellow in good academic standing will lose his or her status if a program is canceled. That is a promise.

Despite current difficulties, our programs remain top quality. Our excellent mix of academic and clinical experience coupled with the level of responsibility our residents are given with the advantage of full-time faculty in the hospital gives Navy programs an edge on civilian residency programs. Our graduates' track record on the boards reflects this—consistently above the mean, *frequently in the 90th percentile.*

To further strengthen oversight and management of our GME program, I recently consolidated all GME program management functions at the Navy Health Sciences Education and Training Command. This action places management of our resources in a single location, strengthens the organization, and makes it possible to offer improved services. HSETC's commanding officer reports directly to the Surgeon General, so a direct reporting relationship remains. The CO, CAPT Dave Kemp, addressed this year's board and spoke of the short- and long-range plans being developed for GME. I am confident that our GME programs will continue to improve and we will soon reach a point where we can easily meet our goals in staffing fleet billets and training billets.

If you'd like more information about GME opportunities, please contact the program manager at HSETC, CAPT Bart Hogan, Autovon 295-5725, Commercial (301) 295-5726.

VADM James A. Zimble, MC

New Life for an Old Veteran

Richard A. Douglas

Docked in the Port of Baltimore, an old veteran rests in the murky waters of the Patapsco River awaiting extensive renovation and refitting. Visible from her weathered decks are historic Fort McHenry and the pier where USNS Comfort *is normally berthed. A quick glance reveals that the elements have taken their toll on the aging vessel. Though her inside compartments remain amazingly well-preserved, her exterior is badly in need of cosmetic repair, making her seem even older than her 46 years. Rust streaks the once immaculate white hull, but upon close inspection one realizes that a coat of paint would work wonders. Since the ship has not been in drydock in over 15 years, the condition of the hull below the waterline remains a mystery.*

Even though she appears to have seen better days, something about her makes this vessel outshine the surrounding ships in the harbor. Could it be her graceful lines, or is it the spirit of those men and women who served her so faithfully over the years?

USS *Sanctuary* (AH-17), a veteran of both WWII and Vietnam, is back—out of mothballs and ready for a new mission after a lengthy interlude from duty. The 520-foot hospital ship had been a member of the Navy's Atlantic Reserve Fleet on the James River for nearly 12 years and was destined for the scrapyard. But an organization dedicated to teaching, researching, and ministering to the health needs of the Third World has given new life to *Sanctuary.*(*1*)

BUMED Archives

***Above: Sanctuary* heads for Da Nang, South Vietnam, 1967.**

LIFE International, a nonprofit organization based in Baltimore, is restoring the aging hospital ship. The renovation of this vessel is the centerpiece of the group's efforts. A 15-year lobbying struggle by Rev. Robert Meyers, president of the group, concluded with the transfer of *Sanctuary* from the Maritime Administration for a fee of $10. Several restrictions do exist, such as the use of the ship for commercial ventures. Also, the Navy has the right to reclaim *Sanctuary* if she is needed for a national emergency.

Former President Ronald Reagan signed the bill which made the transfer possible and a dream come true on 30 May 1988. Meyers' painstaking effort has paid off, as he recalls, "We still have a lot of work ahead of us, but the hard part is behind us—we have the ship."(*2*)

LIFE International intends to convert *Sanctuary* into a floating teaching hospital to aid Third World countries, docking in one port for 18 to 24 months at a time. Her crew can take advantage of three operating rooms,

five intensive care units, a dental department, an obstetrics unit, and an eye-ear-nose-and-throat department. According to Meyers, the *Sanctuary* and her crew will provide health education, medical training and care, technical assistance, and other humanitarian services.(*3*) Although plans are incomplete, the organization intends to make Lagos, Nigeria, the first port of call.

Sanctuary, planned for use as a WWII cargo ship, was laid down as *Marine Owl* on 15 Aug 1944, constructed by Sun Shipbuilding and Drydock Co. in Chester, PA. Due to the need for increased medical care in the Pacific theater, the vessel was converted to a hospital ship by Todd Shipbuilding Co. in Hoboken, NJ, and she took on her new name. Incidently, citizens of Hoboken matched the high cost of conversion with the purchase of war bonds. In contrast, LIFE International must devise its own fundraising scheme to put *Sanctuary* back into operation.

Following her commission on 20 June 1945, *Sanctuary* headed for the Pacific on 31 July, only to dock at Pearl Harbor 4 days after the Japanese surrender. She did play an instrumental role, however, returning home hundreds of liberated POWs from Japan.

In action for less than a year, *Sanctuary* faced deactivation when the war was over. The ship embarked from the Pacific to Philadelphia, where she was decommissioned at League Island 15 Aug 1946. She sat in mothballs for nearly 20 years until the Navy brought her back into action, necessitated by the conflict in Vietnam. *Sanctuary* was modernized by Avondale Shipyards, Inc. in Westwego, LA, and recommissioned 15 Nov 1966. Modernization included a heliport, three X-ray units, a blood bank, an artificial kidney machine, ultrasonic diagnosis equipment, a recompression chamber, and other modern equipment. This equipment dramatically increased her capacity to treat casualties on board.

On 10 April 1967, she arrived at Da Nang, South Vietnam, admitting 717

Photo by the Editor

BUMED Archives

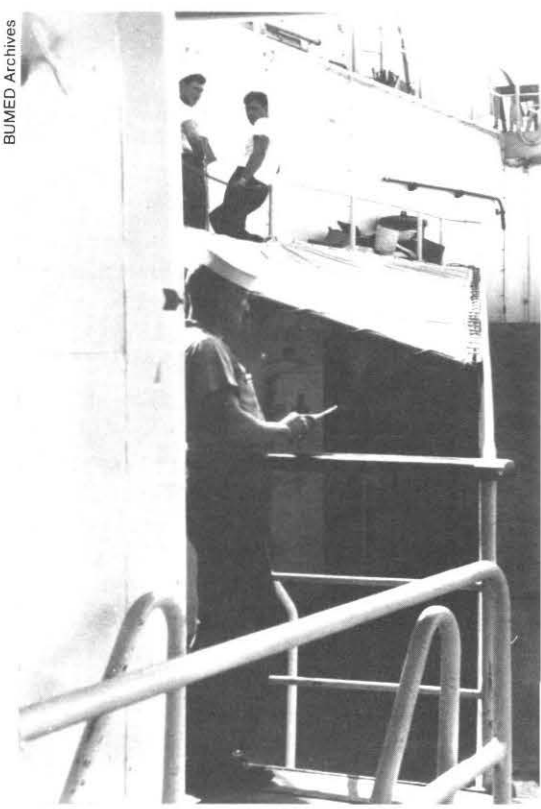


Photo by the Editor

Far left: **Robert Mead, executive director for the *Sanctuary* project, stands on a patient access ramp where thousands of patients once moved during the Vietnam war. *Left:* A corpsman assists an injured marine down the same ramp in 1967. *Above: Sanctuary*'s helicopter deck was once the first stop for many of the ship's Vietnam era patients.**

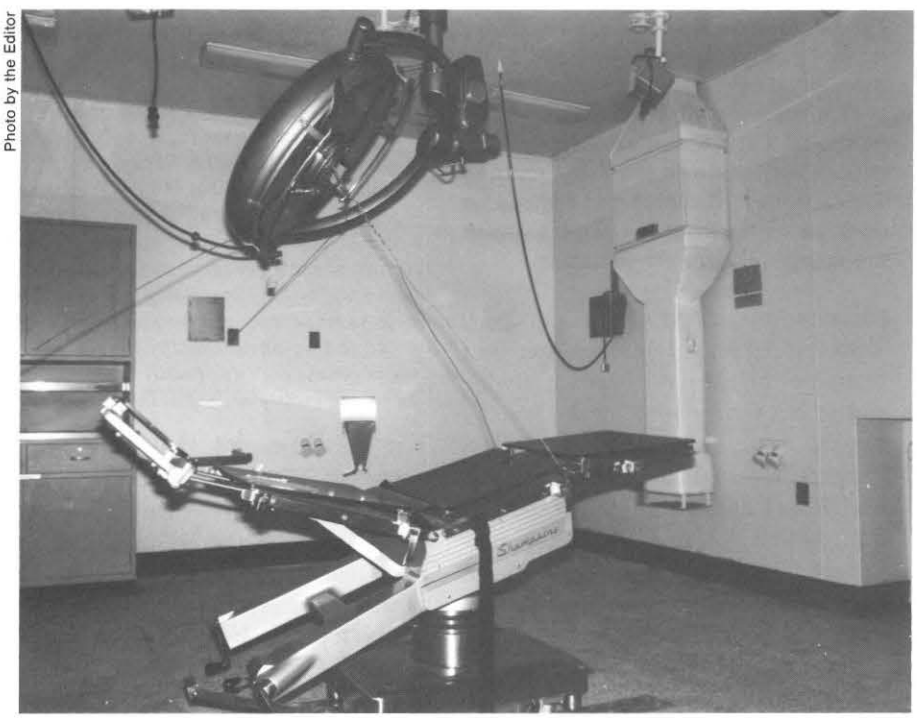
patients by the end of the month.(*4*) Tested quickly, she received her first casualties on the day of arrival. By the end of her first period on the line (54 days), *Sanctuary* admitted 1,368 patients, discharged 698 to duty, and transferred 117 by medical air evacuation; 800 surgical operations were performed, 1,950 units of whole blood were administered, and 8,387 X-rays were taken during this period.(*5*) A crewmember describes the action aboard the *Sanctuary:*

> The surgical pace kept up fast and furious. The wards were filled. On the night of 15 July 1967, the Communists hit the Da Nang airfield with a barrage of rockets that killed 8 marines, wounded 173, and wrecked 42 planes. The lights in the surgical pavilions burned steadily throughout the night as surgeons worked, cutting, retracting, blotting, sponging, and sewing. There were patients everywhere; receiving IV fluids, getting physiotherapy, having blood drawn, getting positive pressure breathing, getting turned in Stryker frames.(*6*)

It is estimated that *Sanctuary* treated more than 25,000 patients during 4 years of service with U.S. and allied forces in the I Corps Tactical Zone and Region One of South Vietnam. On 23 April 1971, her mission completed and U.S. involvement be-

BUMED Archives

Photo by the Editor



A successful mission completed, *Sanctuary* stops at Pearl Harbor with liberated POWs from Japan, 1945. *Left:* This operating room remains in excellent condition, even though it has not been used for nearly 20 years.

ginning to wind down, she departed Da Nang for the last time. The great ship served her purpose admirably, earning 11 battle stars for service in the Vietnam War.

Decommissioned 15 Dec 1971, *Sanctuary* moved to Hunters Point Naval Shipyard, San Francisco, CA, where she was converted for use as a dependent's hospital and as a commissary/naval exchange retail store. Taking on 60 enlisted women and 2 female

officers for nonmedical duties, she became the first U.S. Navy ship with a mixed male-female ship's company. *Sanctuary* was recommissioned 18 Nov 1972 and was prepared to venture to Greece, taking on her new role as a hospital and commissary for families of U.S. servicemen. But before the trip commenced, Greece pulled out of the NATO alliance, canceling the ship's assignment. *Sanctuary* instead reported to Naval Base, Mayport, FL, where she remained until her decommission on 31 Jan 1975.

Sanctuary retired to the Atlantic Reserve Fleet on the James River, where she rested until February 1990. With the support of such individuals as Senate Republican leader Robert Dole, Meyers lobbied Congress for the use of the ship after he first spotted the reserved vessel docked at Mayport. Fifteen years of perseverance paid off when *Sanctuary* was towed from the James River to her temporary home in Baltimore. Moran Towing Co. hauled the historic vessel to her new destination, requiring 30 hours to complete the trip.

Robert Mead, chairman of a Baltimore public relations firm and executive director for the *Sanctuary* project, estimates that restoration will take at least 2 years to complete and will cost approximately $10 million. In addition, the ship will cost about $10 million per year to operate. Obviously, a substantial fundraising effort is ahead for LIFE International, and corporate sponsorship is crucial. The organization is also counting on the support of volunteers to help with labor. Medical equipment experts, electrical engineers, communications experts, pipefitters, and other types of technical volunteers are also needed.

Getting the old hospital ship into operating condition will not be a simple task for LIFE International, but the group has faith. Meyers feels strongly about *Sanctuary*'s resurrection, stating: "There is a tremendous need for this type of project. The mercy ship *Sanctuary* will touch thousands upon thousands of lives."(7) Weathering two wars and two extensive periods in mothballs, she still stands mighty today. The final chapter has yet to be written for hospital ship *Sanctuary*.

Photo by the Editor

Looking forward on one of *Sanctuary*'s portside decks.

• If you would like more information on the restoration project or would like to become a volunteer, please contact Robert Mead at the following address:

LIFE International Medical Center
1609 St. Paul Street
Baltimore, MD 21202

Telephone: (301) 576-1123

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When this article was written Mr. Douglas was assistant to the Command Historian, Bureau of Medicine and Surgery, Washington, DC 20372-5120.

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Any Navy Can Go to War Alone; But Staying There is Another Thing

CAPT Arthur M. Smith, MC, USNR

As one experienced combat veteran commented, "Anyone can go to war, but staying there is another question!" This certainly applies to Southwest Asia, where tactical options of ground forces will inevitably be significantly affected by medical and other logistical needs. Such may also be the case for our forces at sea, should they become engaged in combat. Much to the consternation of tactical planners, reality teaches that these "support" considerations determine the order of battle as well as the sustainability of forces employed.

The Marines who landed in Lebanon in 1957 provide an example. Intestinal disorders such as diarrhea claimed many victims because their commanders did not plan for adequate medical support. Within the Pacific theater during World War II, it was often held that the impact of environmental conditions heavily affected military operations. As was commonly noted, "The mosquito proved to be more powerful than the mortar round." Disease and injury, should they occur aboard Navy ships, can prove to be equally destabilizing to operational capabilities.

Medical support requirements as well as other logistics requirements for Southwest Asia will grow as contingency planning for the area increases. The distances involved, for example, are significant. (Diego Garcia, the location of many of our forward deployed supplies in the Maritime Prepositioned Ship Squadrons is 2,300 miles from the Strait of Hormuz, about 5 sailing days away). The harsh climate and terrain will create great strains on equipment, and the toll on personnel will also be significant.

In many cases the logistics infrastructure—ports, roads, airfields, and railroads—if it exists at all, is primitive. Furthermore, the suspicious politics of many Gulf States may lead to a sustained state of hostility, even among those who are purportedly neutral. Medical support requirements ashore, therefore, will be vastly more complex than they were in Vietnam should operations be projected inland in this region. The problems in medically and logistically supporting seaborne forces are equally formidable.

Realities of Casualty Generation at Sea

Unfortunately, naval warfare will always remain an exceedingly dangerous activity. The catastrophic potential for casualty generation at sea is characteristic of naval combat. Not only is this related to the ubiquitous availability of modern, accurate, and powerful ordnance, but it is also related to the propensity for secondary explosions and fires within the shipboard environment. Several historical examples vividly demonstrate the gravity of this reality:

- In May 1941, a 15-inch armor-piercing shell penetrated the after magazine of HMS *Hood*. A secondary explosion tore the ship in two, and it sank within 90 seconds. There were 3 survivors among a crew of 1,800.
- Two Japanese armor-piercing bombs penetrated the flight deck of USS *Franklin* in March 1945 and exploded within the hangar deck. The resulting secondary explosions and fires destroyed a substantial portion of the ship, resulting in nearly 1,000 casualties among the 3,300 crewmembers, 800 of whom died. Smoke inhalation and burns were the most common injuries seen in survivors.
- In the Falklands invasion, a single missile penetrated HMS *Sheffield* but failed to explode. Nevertheless, the searing heat generated by its passage through the hull and into the forward engine room was sufficient to set fire to paint, PVC cable, and other flammable materials. Within 15-20 seconds the ship was full of black, acrid smoke. Twenty died in this incident, and 24 additional wounded, suffering from burns and smoke inhalation, were transferred to other ships.

Saipan, summer 1944: A wounded patient is transferred at sea.

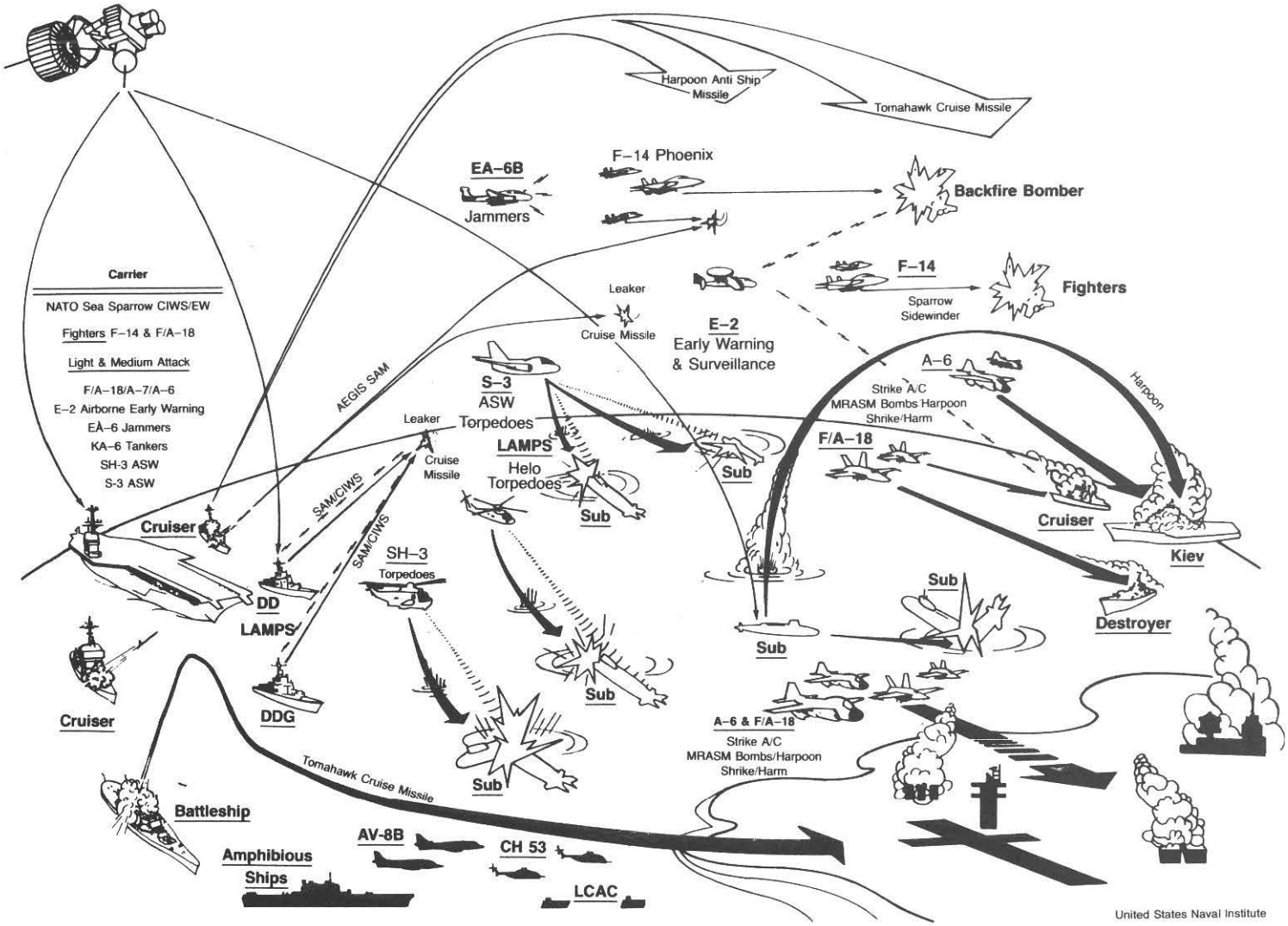


Figure 1

• The Argentine bombing of the British auxiliary ship, *Sir Galahad,* resulted in the sudden generation of 179 casualties, including 83 burns, many lung problems from acrid smoke inhalation, and large numbers of extensive tissue and bone injuries; a "mass disaster" for even a well-equipped and well-staffed land-based medical center.

• Although not the recipient of hostile fire, USS *Forrestal* experienced a major conflagration while on Yankee Station in the Gulf of Tonkin, and suffered 134 men killed and 162 injured by the explosions and flames.

Figure 1 demonstrates an optimized schematic of modern naval confrontation utilizing a large spectrum of Navy assets. Our own painful national experience with naval casualty generation on USS *Stark,* suffering 37 killed and a smaller number of injuries, can certainly be expected to be increased many-fold in light of the realities of modern naval warfare. British losses of embarked personnel at the Falklands from Exocet missiles penetrating the hulls of *Sheffield, Atlantic Conveyor,* and *Glamorgan* were substantial. Bombing created additional substantial losses aboard *Ardent, Antelope, Coventry, Sir Galahad,* and *Sir Tristam.* Given the employment of naval forces as diagrammed in Figure 1 and the evolving heightened military sophistication throughout the world, the potential for attrition of naval assets is very real.

Injuries to Navy personnel at sea from blast overpressures, fragment penetrations, underwater shock motion, fire injury, and smoke inhalation are difficult to calculate specifically. Projected battle casualty estimates for U.S. Navy warships vary with the nature of the differing studies utilized and their differing databases. Nevertheless, certain threads of continuity run through all of them, emphasizing the fact that large numbers of personnel can expect to be killed or wounded from a relatively small number of successfully targeted and delivered munitions.

Utilizing the Naval Afloat Manpower Casualty Assessment Model, for example, the generation of wounded personnel aboard a Perry

Class FFG would be expected to vary between 46 and 76 from a single missile hit, extending to as high as 81 if the number of "hits" increases. Accompanying at-sea death rates would vary from 34 to 204 depending upon the degree of damage sustained. A CV hit by a series of torpedoes and missiles could expect wounded numbering as many as 1,700, accompanied by the deaths of 2,670 fellow crewmembers. A single AOE attacked with missiles and torpedo could anticipate 250 wounded and 180 dead. A CG would sustain 167 wounded and 141 deaths under similar circumstances. Lastly, a DDG struck by two missiles and a torpedo could suffer as many as 106 wounded and 90 dead. The nature of various casualty estimate models vary, but the fundamental reality remains that single ships in wartime can be subject to enormous casualty generation. Can the survivors be adequately cared for?

Within a surface battle group—amphibious task force grouping, where would the casualties be cared for? The CV heavily involved in offensive operations can hardly afford to stand by for sustained reception of casualties via sea or air lift. The ships of the amphibious task force, although theoretically capable of assuming responsibility for casualty care, remain basically untested other than the aging LPH units in the amphibious task forces that supported U.S. operations in Grenada and Lebanon. During these campaigns, USS *Guam,* steaming off the coast of Grenada, was overwhelmed by the receipt of 36 casualties simultaneously. Off the coast of Beirut in October 1983, USS *Iwo Jima* primarily served as a staging point for subsequent evacuation of a large proportion of the living casualties following the Battalion Landing Team headquarters bombing.

Afloat medical facilities may be utilized for stabilizing casualties primarily and performing forward echelon initial medical care only. The logistical limitations placed upon an afloat task force, as well as limitations upon the numbers of available and adequately trained medical care personnel, however, require that further echelons of medical care be available beyond the afloat battle group for any sizable number of casualties.

In essence, no naval ship in a battle mode, except perhaps a well-protected hospital ship, can afford to manage the dimension of casualty load to be expected in future naval engagements. The TAH itself would be heavily taxed if even a small proportion of the injuries were critical, as evidenced by the logistical and manpower burden generally imposed upon land-based civilian emergency facilities in the face of mass casualty or casualty overload situations.

In reality, from the medical perspective, land-based, advanced-based logistic support facilities are critical in the support of naval warfare. (Fleet hospitals are one such arm of support in the Navy's armamentarium.) In a matured theater of operations, as existed during the latter stages of World War II, large numbers of mobile, base, and fleet hospitals were located overseas. (In fact, during the invasion of Okinawa in World War II, the kamikaze attacks upon the Fifth Fleet created such intense volumes of casualties among the forces afloat, that in order to facilitate the continuity of naval operations, six hospital ship transports were required for evacuating the mounting shipboard casualties to Navy fleet hospitals in Guam.)

The Contemporary World

The Iraqi invasion of Kuwait may well be the first major act of aggression in the post-Cold War era. The world may now be getting its first look at the means by which nations will define their interests in the new world order, and what it may portend for future episodes of piracy and terrorism.

As the current Middle East crisis demonstrates, the potential for employment of military forces will probably continue its shift from superpower confrontation to involvement and intervention in Third World regional conflicts. Recent history also demonstrates that Navy forces will remain an important component of our overseas military projection capabilities.

As a recent GAO publication noted, "The low intensity threat is not necessarily a low technology threat." It is no longer axiomatic that we can expect to face unsophisticated armaments when deploying military forces to local conflicts around the world, even if Warsaw Pact forces are not involved. Given the worldwide diffusion of economic power, there is increased access to advanced technology and increased military firepower.

Multiple "players" around the world now have at their disposal not only weapons inventories which are capable of mass destruction, but the means to deliver them as well. These include ballistic and cruise missiles, chemical and biological weapons, and in a few cases, nuclear weapons. The ability of more countries to disrupt our surveillance, electronic intelligence collection, and early warning capabilities are expected to increase as well.

Because of their suitability for dealing with regional crises, U.S. amphibious and shallow water forces will no doubt assume greater importance in future Navy operations. Unfortunately, as military access to overseas bases such as those at Subic Bay becomes more restricted, overflight rights will become increasingly denied as well, and freedom of navigation will be contested more frequently. The potential availability of long-term logistical support for our forces at sea, including medical support, will thus diminish.

Consequently, in order to sustain a Third World power projection capability, "flexible" maritime forces will achieve greater significance. Mobile, flexible joint power projection capabilities will be the choice, with particular emphasis upon maritime forces. Attention will no doubt focus principally upon potent, tailored, task oriented, and ready surge forces, which will compensate for lost overseas bases and forward presence. Fast sealift and shipborne pre-positioned material will also receive greater atten-

tion in support of these activities.

As a result of these changes, traditional naval deployments, as we now know them, will be undertaken only to the extent that they are perceived to be required for regional deterrence and stability. "Forward deployable" in lieu of "forward deployed" will become the focus of the maritime strategy. "Situational presence" and regional crisis missions will achieve primacy for the Navy/Marine Corps team, reinforcing the perception that continuous forward presence is no longer required.

In support of these forward deployed, geographically isolated groups of afloat Navy combatants, previously negotiated medical evacuation agreements are expected to facilitate either the establishment of U.S. logistics base facilities ashore in foreign territories or U.S. casualty insertion into host nation medical support systems. This does not consistently guarantee adequacy of medical care, however, especially in politically hostile or unstable regions of the world. For example, the seemingly limited coup d'etat in Portugal in 1974 had repercussions for global U.S. naval operations; it led to new regimes in Angola and Mozambique that no longer allowed the United States access to their ports, exacerbating problems for our deployments to the Indian Ocean. Illustrative of our fluctuating fortunes in such ventures, however, is the fact that after events in Ethiopia, Iran, and Afghanistan, new logistical support opportunities arose by virtue of more receptive attitudes on the part of the governments of Oman, Somalia, and Kenya.

An additional question relates to whether the nations with whom we have such medical logistics support arrangements have internal medical systems that would provide the *quality* of medical care that we expect for our wounded, or must we provide all of the logistics ourselves and merely settle for the use of their territory (as primitive or uninhabitable as it may be)? Will we always have medevac overflight rights over territories adjacent to those nations who welcome our use of their sovereign domain for advanced logistics support bases?

Joint Medical Support Services

Given currently austere budgetary realities, the potential requirements for large scale casualty care in support of afloat operations will inevitably extend beyond the Navy's own capabilities. The Navy must ultimately depend upon integrated multiservice support from the appropriate unified commander.

There is little doubt that increasing attention will be brought to bear upon the stated requirements of the unified CINCs for managing future contingencies in their areas of responsibility. Admittedly, each of them has different priorities and concerns. Nevertheless, overall medical care requirements in the operational setting are generally ordained by the unified CINCs.

Medical support requirements and capabilities in these differing regions may well vary, and *planners need to have a fundamental appreciation of the support that other services can bring to the overall operation.* After all, medical readiness can exist only where adequate resources are available, and these will become dependent upon triservice collaboration. Furthermore, the "short fuse" of many modern day military events requires that effective plans have already been formulated for their use. The U.S. Joint Chiefs of Staff, for example, had only 2 days to implement a complete plan for the Grenada operation—from 22 Oct 1983, when the Organization of

Distances Within PACOM

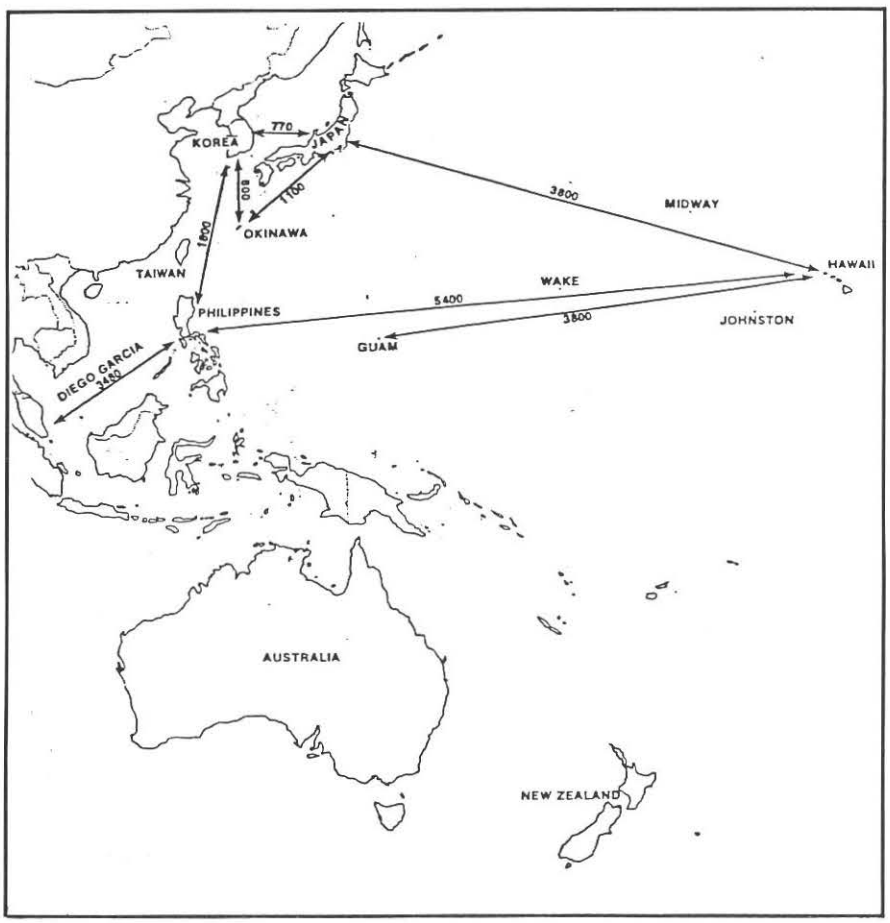


Figure 2

Eastern Caribbean States asked the United States for assistance—to the designated landing of 24 Oct.

Geographic considerations can also pose significant constraints upon medical support for the large numbers of casualties to be expected from naval engagements. Transposing the scenario depicted in Figure 1 from the purview of the Atlantic Fleet to the 100 million square mile domain of PACOM, the territory of the Commander in Chief, Pacific (a venue which encompasses 50 percent of the earth's surface and extends from the west coast of the Americas to the east coast of Africa, and from the Arctic to the Antarctic), poses additional problems (Figures 2 and 3).

The distances between traditional terrestrial points of potential support are significant, as they were for the British during the Falklands war. This will certainly require an integrated multiservice support network to provide for casualty care as well as other logistical necessities. For survival of injured Navy task force personnel, it is essential that all service components have developed short- and long-term plans for joint use of their medical resources in wartime.

Requirements for Successful Fleet Medical Support Operations

Fundamental questions must be resolved before one can expect a workable casualty support system beyond that immediately available aboard our deployed naval assets. This applies to both the unified command and all of its component commands.

- There must be an individual (Command Surgeon) or organizational entity that is singularly responsible and accountable for medical readiness within the unified command.
- Command *authority* over joint medical operations in the unified command must also be vested in a single individual, appropriately placed within the command structure, with an adequate staff to discharge those joint responsibilities.
- There must be a clear and functional chain of command for the development and execution of joint medical plans within the area of responsibility of the joint command.
- There must be sufficient authority vested in the chain of command to ensure that individual service component plans are coherent and compatible.
- Medical planning must be an integral part of operational planning at every echelon of command within the unified command. This is to facilitate exercising and monitoring medical command, control, and communications throughout the theater.
- Sufficient numbers of medical planners must be available at all echelons within the unified command.
- Workable plans and mechanisms must exist for exercising the services' medical logistics support capabilities in times of war and integrating them where needed.

Pacific Airlift Channels MAC C-141/C-5

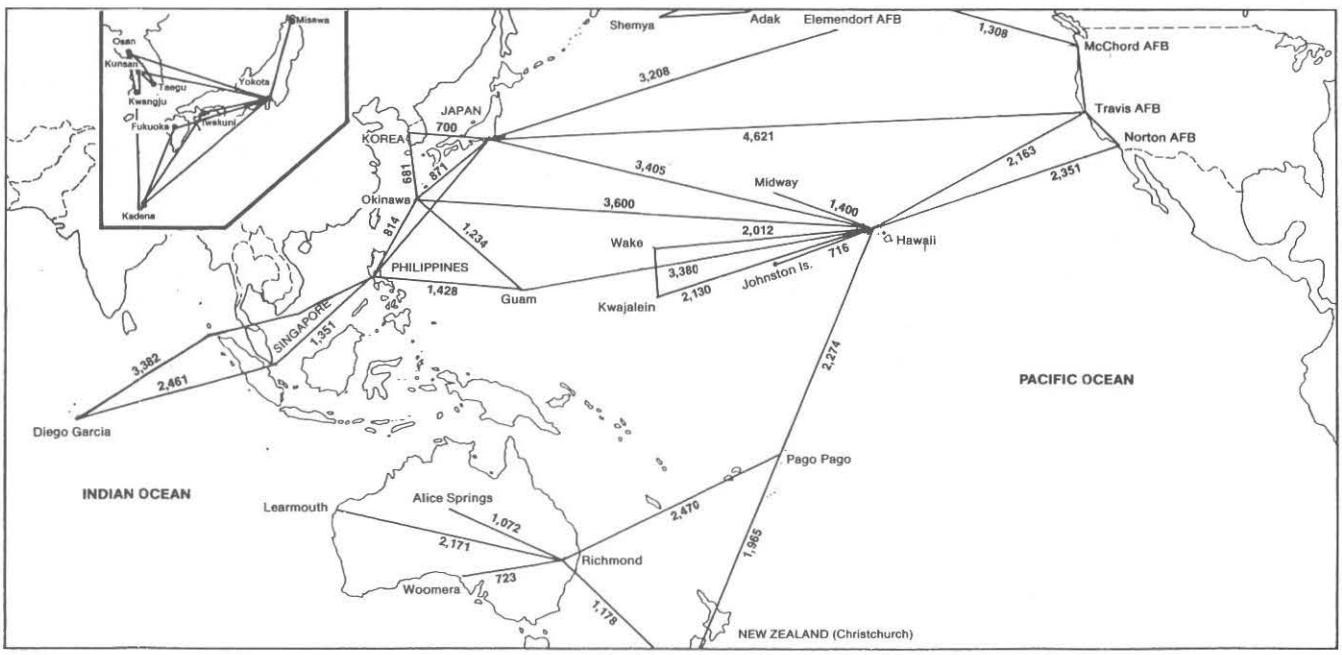
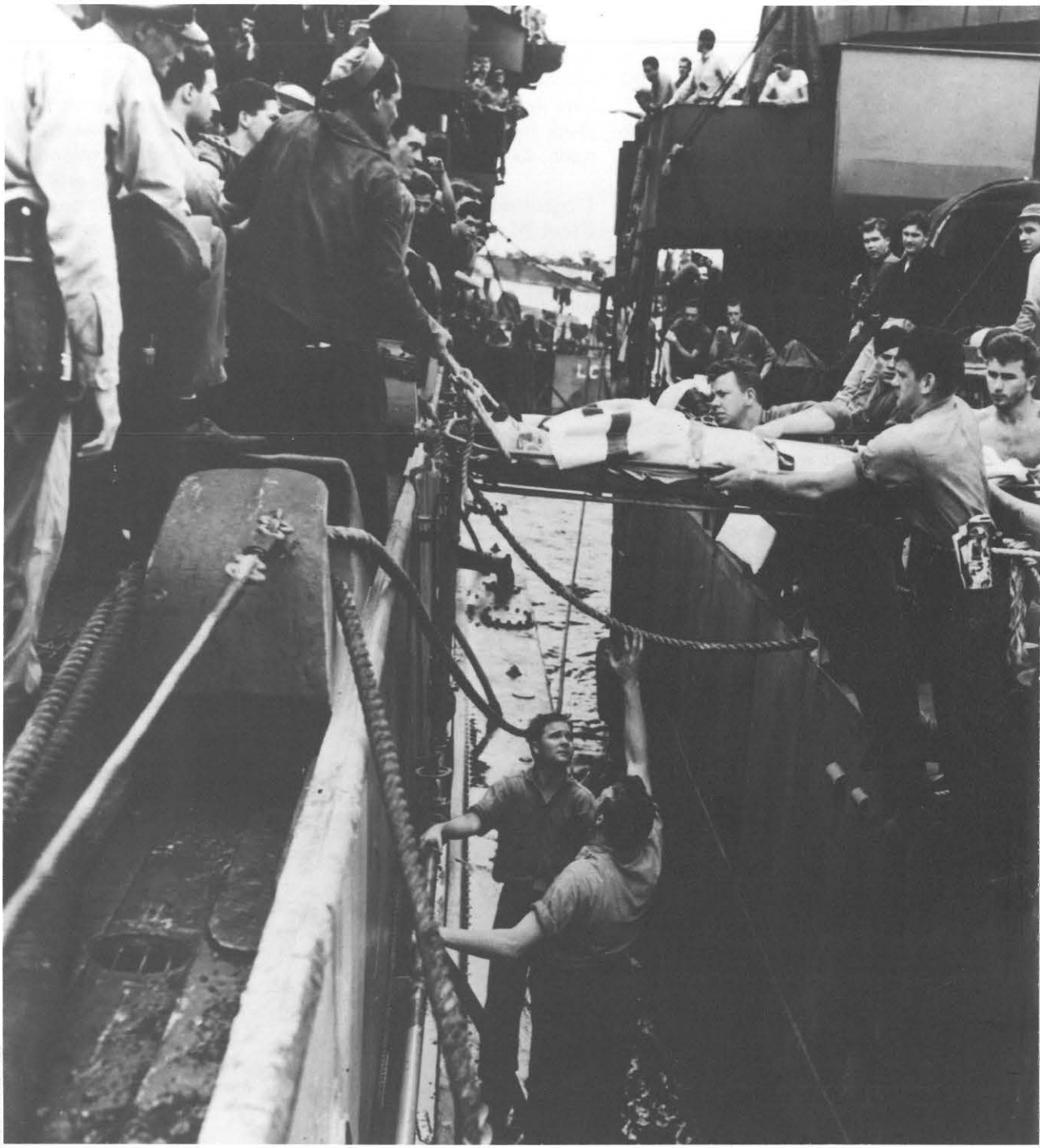


Figure 3



BUMED Archives

• The existing peacetime medical evacuation system must be adaptable to wartime or military emergency conditions and can functionally interact with each service's own medical system. Furthermore, it must be able to accept all forms of casualties, including biological, chemical, and radiological warfare casualties.

• Mechanisms must have been well established in order to determine who controls the medical evacuation system, determines aircraft destinations, patient distribution, as well as who establishes priorities for medical evacuation.

• Relative to joint medical planning, defined guidance must be available at all levels of command and for all service components. Furthermore, there

Wounded men from the USS *Nevada* are transferred to an amphibious craft for further transfer to a Navy hospital ship. Eleven men were killed and 41 wounded when a Japanese suicide plane hit the battleship off Okinawa on 27 March 1945.

is also guidance for the management of casualties of biological, chemical, and radiological warfare at all echelons.

- While accurately portraying requirements and capabilities, joint medical plans must be comprehensive, realistic, and well integrated. Such plans should provide clear and comprehensive guidance for their execution, when required. Furthermore, their feasibility should have been tested in previous exercises.
- The existing system of communications within the joint command purview must be sufficient to support wartime medical operations. Moreover, the chains of communication must be simple and direct.
- The medical capabilities, if any, of friendly nations should have been assessed relative to providing hospitalization and evacuation support in the event of mass casualties. This support potential should have been incorporated into the medical planning system, if reliable host nation support would be available. Furthermore, workable mechanisms must exist for arranging that support. *This also implies that adequate means exist for swiftly communicating our medical requirements to friendly nations in times of crisis.*
- Flexibility must be built into medical plans and capabilities to facilitate a response to sudden and unpredictable requirements such as terrorist missile attacks upon an afloat platform or a land-based facility. If such activities produce biological or chemical casualties, we must also be prepared.

Implementation of Combat Medical Support Plans and Programs

Despite drastic political changes in Eastern Europe and the Soviet Union, coupled with the potential for treaties leading to major reductions in weapons, certain realities of military preparedness remain. Men and women continue to be our most vital asset for defense. Despite current trends toward increasing sophistication in weaponry and greater use of automation in military systems, we still rely almost completely upon humans to make our military systems function. Unfortunately, many operational analyses barely recognize this dependence. They tend to concentrate primarily upon the vulnerability of hardware. They do not recognize that personnel casualties, and the ability to replace them, are just as important in determining force strength as the number of weapons remaining.

Medical readiness can exist only where adequate resources have been made available, and effective plans have been formulated for their use. Have the aforementioned criteria been effectively incorporated into unified command medical planning? Such was certainly *not* the case in the U.S. European Command in 1983 or the Pacific Command in 1984. This was the result of the low priority that was habitually assigned to medical readiness by the participants in the planning, programming, and budgeting system. Since then, significant funds have been expended in purchase of operational medical hardware items, such as two TAHs and multiple deployable medical facilities (fleet hospitals in the Navy), that might prove useful in long-term strategic conflict. Nevertheless, a recognition of the validity of joint service medical planning, and the highly probable need for contingency utilization of triservice medical assets during future major naval engagements, requires additional and continuing emphasis as well as repeated and practiced implementation. □

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Highlights From the Naval Medical Research and Development Command

Bethesda, MD

• A New Method for Growing Bone

A new bone cell culture system, developed by researchers at the Naval Medical Research Institute (NMRI), Bethesda, MD, allows the complete process of bone formation to be studied under controlled laboratory conditions. Scientists can begin to understand and control the processes of bone cell proliferation, matrix synthesis, and mineralization, events critical to the process of bone healing after combat-related and other traumatic injuries.

Thin slices of bone are treated with collagenase and dispase enzymes to free the individual cells from the bone structure. Bone cells grow in culture until multilayered and then are fed with a "mineralization" medium, allowing the cells first to form nodules and then to organize into trabeculae (thin strands of bone). Trabeculae fuse into solid sheets of mineralized bone. The initial formation of a multilayered sheet of bone cells, through the provision of appropriate culture conditions and the maintenance of the multilayer during matrix synthesis and mineralization, was found to be key to the success of the *in vitro* bone culturing technique.

In the near-term, the ability to culture bone provides scientists a method for studying and controlling the physiological stages and biochemical factors of bone formation. The researchers have already identified a new hydrolytic enzyme that may prove important in the maturation of newly secreted bone matrix. The ultimate benefit of this bone-culturing system will be the development of new treatment strategies to enhance bone repair in Navy battlefield casualties. It is envisioned that large sheets of human bone cells could be grown *in vitro* and implanted in patients to fill bone deficits, or used with other implants to ensure the success of post-traumatic reconstructive surgery.

* * *

• Tuberculous Meningitis Test

Researchers from the U.S. Naval Medical Research Unit No. 3, Cairo, Egypt, and the Centers for Disease Control (CDC), Atlanta, GA, are developing a rapid diagnostic test for tuberculous meningitis, a disease caused by *Mycobacterium tuberculosis*. This new test is based on the frequency-pulsed electron capture measurement of carboxylic acids separated by gas-liquid chromatography (GLC) and specifically detects tuberculostearic acid in cerebrospinal fluid of patients suspected of having meningitis.

Conventional approaches to diagnosing tuberculous meningitis are frustrating because *M. tuberculosis* organisms are scarce and difficult to detect in cerebrospinal fluid. Other diseases present similar clinical signs, making a definitive diagnosis of tuberculous meningitis difficult. The GLC-based test produces results in 3 hours, while the current culture-based assay takes approximately 1 month to complete. Additionally, this new test is far more sensitive than is the standard culture method (95 percent and 50 percent sensitivity, respectively) and has a 91 percent specificity for *M. tuberculosis*. This important rapid diagnostic technique will enhance the physician's ability to make an otherwise difficult and delayed diagnosis and will enable rapid initiation of correct therapy. Application of this method to the diagnosis of other life-threatening infections is anticipated.

* * *

• NMRDC's First Cooperative Research and Development Agreement

CAPT James N. Woody, commanding officer of the Naval Medical Research and Development Command (NMRDC), signed the command's first Cooperative Research and Development Agreement (CRDA) with Pharmingen, a California-based corporation which provides biological test materials and monoclonal antibody tests to the public. CRDAs were created by Congress in 1986 as part of the Federal Technology Transfer Act. The Federal Technology Transfer Act and other related legislation intends to facilitate the transfer of technology developed by government scientists to industry for commercial utilization and ultimate public benefit. This CRDA transfers a murine hybridoma cell line developed by Dr. Donna Sieckmann of the Naval Medical Research Institute (NMRI), Bethesda, MD, to Pharmingen. The cell line, named "DS-1," produces monoclonal antibodies against mouse IgM , providing a key reagent for immunoglobulin test kits. In return for the use of the DS-1 cell line and the opportunity to develop its commercial potential, Pharmingen will pay NMRI a fee based on sales of marketed monoclonal antibody test kits.

For additional information on these or other medical R&D projects, contact NMRDC Code 40 at Commercial (301) 295-1468 or Autovon 295-1468.

Desert Survival:

Shifting the Odds in Your Favor

HM1 Warrick M. Yeager, USN

Less than 36 hours after SGT Martin walked away from the disabled vehicle, a search team found the remains. The sunken eyes and stiffened eyelids, split swollen tongue, and blood tinged perspiration on cracked, shriveled skin painted a clear picture of just how harsh and unforgiving the desert can be. This unfortunate individual was not unlike many others in the unit. They too could easily have overestimated their ability and underestimated the climate with similar and fatal results.

The ability to make correct decisions and survive under severe physical limitations and emotional stress dramatically increases with proper training and familiarity with possible operational scenarios. All personnel presently in or about to enter into a desert environment would benefit greatly from training focused on the key concepts of basic desert survival.

The key to desert survival is clearly understanding the relationship between physical activity, air temperature, water consumption, and the physical limitations brought on by these factors. Rationing of water is *not* part of the equation. High temperatures and extremely low or no precipitation pose a unique situation in which only proper training can shift the odds in your favor.

Although man's existence in the desert can be traced back nearly 10,000 years, our species has failed miserably to evolve or adapt to the point where it can function on reduced water. Elaborate dehydration studies conducted on American soldiers during World War II by Dr. E.F. Adholf and a group of scientists from the University of Rochester, concluded the following:

Providing that adequate drinking water existed, troops could be conditioned to withstand long marches and hard labor in the desert heat. However, any reduction in the amount of normal water intake was quickly followed by breakdown in their physical control over body heat which in turn led to heat prostration. These findings were true even among those considered to be in excellent physical shape. Hence, the old belief that individuals can be trained to do with less water is not only false, but also very dangerous.

The present Iraq-Kuwait crisis is unique in that the physiological, psychological, environmental, and topographical aspects, as well as the indigenous flora and fauna tend to compound an already difficult and dangerous situation. Utilization of specialized skills such as desert survival training is our only hope if we are to enter, operate, and return from the desert without incurring heavy noncombat casualties due to environmental factors. However, like all lifesaving skills, desert survival training *must* be learned through a combination of classroom and practical application. It is *highly recommended* that these skills be acquired prior to deployment into areas of concern. Additionally, they would best be taught utilizing scenarios which will enhance the student's awareness of what they may face.

Operational scenarios tend to build confidence while providing a learning environment semifree of risk. Regardless of the training method used, relevant training will include insight into the physiological, psychological, environmental, topographical, and indigenous flora/fauna, all of which affect survival. In addition, the training must cover basic survival skills. The following is a brief synopsis of what a desert survival training program must include.

Operation Scenario

You are about to be deployed to the third largest desert in the world. It spreads over 1 million square miles, one-third of which is sand. This area holds the distinction of being the only desert in the world completely absent of any permanent bodies of water. Climatic conditions range from areas of high humidity and mild temperatures to areas of extremely high heat and no precipitation.

There are both indigenous flora and fauna which may impede operational success. Of primary concern is the

flora containing spiny succulents known as euphorbs. These plants can cause painful abrasions and debilitating puncture wounds. The fauna of concern is represented by both vertebrates and invertebrates. The vertebrates include the Arabian bull viper, Sahara sand viper, Egyptian cobra, saw-scaled viper, sea snake, and desert black snake. The invertebrates are centipedes, scorpions, and sandflies.

Endemic diseases which will greatly affect operational success include acute diarrhea, malaria, typhoid, cholera, meningococcal meningitis, viral hepatitis, leishmaniasis, schistosomiasis, and sexually transmitted diseases.

Operational Concerns

Physiological. Dehydration is a major concern in any desert. In an attempt to acclimate to the desert, the human body makes a few physical adjustments. To cool the body more effectively, sweat glands increase their output of sweat to slightly more than a quart per hour. Blood circulation is increased in the surface vessels helping to cool the body while the kidneys slow the rate at which salt is lost from the body.

Although able to make these slight changes, lack of sufficient water will cause a rapid decline in an individual's ability to make decisions and perform efficiently. The Greek philosopher Miletus noted: "The first of things is water." Proportionally, the largest component of the human body is water and without it we will die.

Under the best of conditions, inactive survival requires a quart of water a day. As heat and activity increase so does the water requirement. As long as the intake of water equals or exceeds water loss, performance should not be adversely affected. Failure, however, to take in adequate water leads to dehydration, which in turn affects the ability to make rational decisions. In a survival situation irrational decisions will kill you long before you die of dehydration.

Because dehydration is so debilitating one must know its signs. With 1-2 percent water loss, an individual will experience thirst. With a 2-4 percent loss comes dry mouth, loss of appetite, discomfort, and slow movement. A 4-6 percent loss results in an increased sensitivity to heat, increase in pulse rate, sleepiness, and tingling sensation in the hands and feet. With a 6-8 percent loss heat exhaustion results, causing a 60 percent loss of physical efficiency. In addition, an individual experiences dizziness, severe headache, begins stumbling, and requires visual aids. Individuals who become 8-10 percent dehydrated suffer from heat stroke, muscle spasms, and kidney damage. The body also stops making saliva, and the person cannot stand alone. At 10-12 percent dehydration, the body core temperature approaches 104° F or higher. It is during this phase of dehydration that delirium accompanied by hallucinations, raving, and wandering of the mind occur. The individual is unable to take care of himself. At 12-14 percent the tongue swells and skin starts to wrinkle. If a search party found the victim and could save him, he could still live. However, as one approaches the 14-16 percent dehydration level the body core temperature would reach 106° F plus. The eyes would sink back in their sockets, and loss of vision would occur. At 16-18 percent the eyelids would stiffen, the skin become numb, and loss of hearing would occur. Finally at 18-20 percent death occurs.

Look for water while you still have water. If you are going to run out of water, decide what course of action you will take and *write it down.* It is a lot easier to follow a written plan under stress than try to formulate one.

Psychological. The physical hardships brought on by a survival situation are directly related to psychological stress. Understanding this stress is as important as understanding environment or equipment. Some of the most common physical and emotional factors which create survival stress are:

Heat. *Do not* exert yourself during the hottest parts of the day. Keep your clothes on and head covered. Those unaccustomed to hot climates will experience weakness and lack of motivation. Remember your body needs time to adapt. Work with it, not against it.

Thirst. Store water in your body not in your canteens. If you have little or no water *do not eat.* Your body must use its water to help digest food and carry off waste. This in turn dehydrates the body. Drink as much as you can, when you can.

Pain. Pain is your body's way of telling you something is wrong. Pain distracts from your ability to concentrate on more important matters. Recognize its source and nature, but do not let it get the best of you.

Cold. The effects of cold, like heat, reduce your ability to think clearly and efficiently. Deserts typically have hot days and cold or cool nights. If you have to travel the ideal time is after 9 or 10 p.m. and before the sun rises. If you are stationary, keep warm as cold weakens your will to survive.

Hunger. Hunger definitely affects the will to survive. An individual can go substantially longer without food than without water. If limited water exists, either eat very small amounts or not at all. Lack of nourishment will lead to weakness, dizziness, weight loss, and possible blackout if you stand up too suddenly. If ample water exists undoubtedly edible items also exist. Your survival may depend on your ability to set aside your personal dislikes and prejudices and eat what is available. So go ahead and enjoy that fat, juicy grub.

Fatigue. Hopelessness, frustration, overexertion, and boredom all cause mental or physical fatigue. These are very dangerous conditions as they lead to the "I don't care feeling" which in turn greatly reduces your survival chances. One must recognize the signs and symptoms of fatigue and concentrate on the ultimate goal—survival. A change of activity or rest are the primary means of dealing with and overcoming these conditions.

Loneliness. Isolation under threatening conditions leads to loneliness which itself leads to feelings of help-

lessness and despair. You must accept the reality of your situation. Do not worry about long-range problems or the what ifs—concentrate on matters at hand. Survival is a minute-to-minute, day-to-day challenge.

Environmental. Six major environmental factors which must be considered when entering a desert environment are: low rainfall, wide temperature ranges, intense sunlight/heat, mirages, sparse vegetation, and sandstorms. One's ability to deal effectively with these factors rests largely on their understanding of how to make these elements work for them, not against them.

Low rainfall, quick runoff, and the high evaporation rate typical of desert areas forces the need for water to be the foremost thought in desert survival. Since some areas receive less than 4 inches of rain annually, other sources must be considered. Possible sources worth considering would be natural cisterns, native vegetation, solar stills, the bends in a dry stream bed, and the lowest point between sand dunes.

Temperatures may range from as high as 130° F during the day and as low as 50° F at night. Normally the rocks and sand are 30-40 degrees hotter than the surrounding air temperature; when the air temperature is 100° F, the sand temperature may reach 130 to 140° F.

The highest temperature on record for the Western Hemisphere is an impressive 134° F recorded on 10 July 1913, in Death Valley, CA. This temperature is exceeded by only one world record of 136.4° F reported at El Aziza, Libya in 1922. In both cases the average ground temperature was 174° F!

In contrast to these high daytime temperatures, nighttime temperature in the desert drops very rapidly. Those who do not have warm clothing or are unable to move around can in some cases be chilled to the point of hypothermia. The coolness of early evening (after 9 or 10 p.m.), morning (before sunrise), and night are by far the best times to work and travel.

Intense sunlight/heat hurts unprotected eyes, burns the skin, and greatly increases the body's need for water. Stay in the shade, remain inactive, and wear sunglasses for eye protection. One of the most interesting effects brought about by intense sunlight is the phenomenon known as a mirage.

Mirages are optical phenomena caused by refracted light. Light waves from above strike the intensely heated air rising from the desert floor and reproduce an image of the sky in the form of distant rippling water. While water is most often the produced image, irregularities in an image may produce trees or other shimmering objects. Mirages make it difficult to judge distances and identify objects. If you can get 100 feet or more above the superheated air on the desert floor this effect can be overcome.

Vegetation, though typically sparse in the desert, sometimes does exist. Whenever possible, its cover should be sought as temperatures in the shade will average 20-30 degrees cooler than the surrounding air temperature. Abundant plant growth indicates the presence of water; however, this water is often very high in minerals such as borax, salt, alkali, and lime. By distilling this water in a solar still however, it can be made drinkable.

Sandstorms or sand-laden winds are common occurrences in most deserts. The "Seistan" desert wind in Iran and Afghanistan often blows constantly for up to 120 days at a time. In the Saudi Arabian desert, major sandstorms can be expected at least once a week. Winds during the day average 2-3 miles per hour with gusts up to 70 or 80 mph in the early afternoon.

One of the greatest dangers of these sandstorms is the possibility of becoming disoriented and lost. The best course of action is to cover your mouth, nose, and eyes, sit tight and ride it out. It is better to have lost a little time than have expended valuable water and time walking in circles.

Topographical. Although deserts all appear to look the same, they, in fact, have five basic terrain types which seemingly blend together. These include highly dissected terrain commonly called "gebel" or "wadi," sand dunes, rocky plateaus, mountains, and salt marshes.

Gebel or wadi areas are mazelike patterns void of a set directional flow. Formed by years of rainstorms and erosion, these miniature canyons range in size from as little as 6 feet deep and 10 feet wide to several hundred feet deep and wide. They do provide excellent cover and concealment, however, caution must be used so that you do not become turned around, lost, or drowned in their mazelike network.

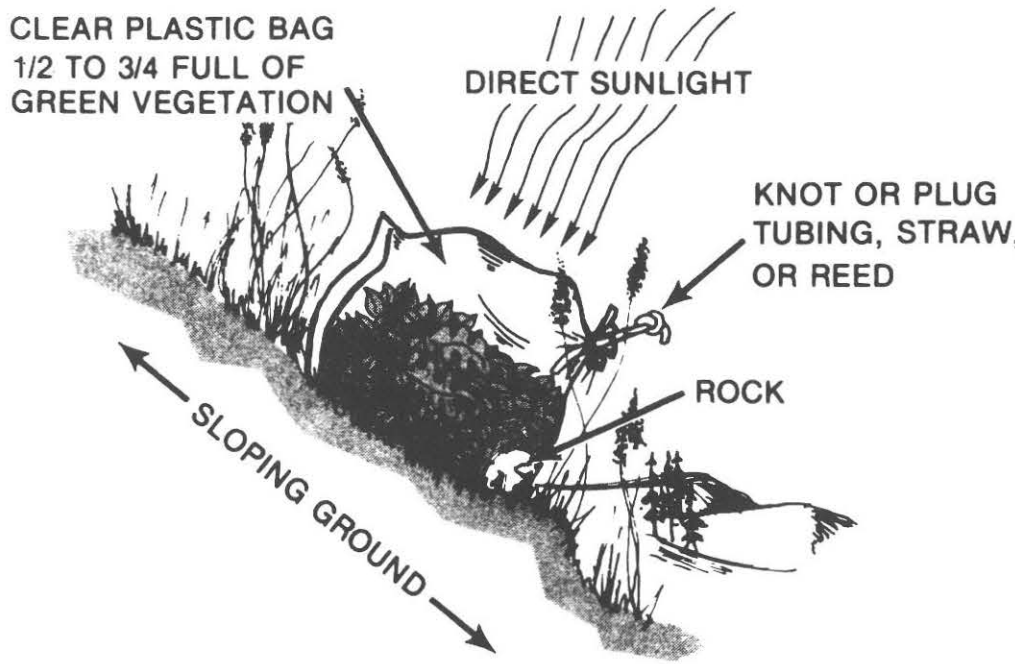
While drowning in the desert sounds like an incongruity, it happens frequently. These drownings are caused by the sudden, forward rush of rainwater runoff into an area which normally receives no rain at all. Because flash floods happen so quickly in the desert, the unwary and unwarned are very vulnerable.

Sand dunes which can be 10-15 miles long and 1,000 plus feet in height are hills covered extensively with sand and gravel. They can be totally devoid of vegetation or have scrub as high as 6 feet. The Sahara Desert, the empty quarter of the Arabian Desert, and California and New Mexico deserts are good examples.

Remember, traveling through sand dune deserts should be avoided when possible. If you should find yourself in such a desert though, be aware of an interesting phenomenon known as ***desert roar,*** occurring when sand dune particles are displaced under foot. Desert roar sounds much like a train in motion.

Rocky plateaus are characterized by many types of soil and broken rocks on or very near the surface. Also known as desert asphalt, this terrain contains extensive flat areas with rock outcroppings. Shade can be found here as well as natural cisterns which collect water following a rain. These areas are easy to traverse.

Mountains are characterized by scattered ranges and high ground which rise either gradually or abruptly from the flat areas. Although rainfall is infrequent, its occurrences on this high ground can cause rapid runoff in



Above ground still

the form of flash floods. Climbing mountains requires extra physical exertion, thus increasing your need for food and water.

Mountains are extremely dangerous at night because of their dead rock, deceiving depth perception, and high snake population. They do, however, pose benefits in the form of shade, possible cistern sites, and the fact that at night they release the heat which was absorbed throughout the day.

Salt marshes are flat, desolate areas occasionally spotted with clumps of salt grass but relatively little other vegetation. They occur in arid areas where rainwater has collected, evaporated, and left large, crusty deposits of alkali salts, or water so salty it is undrinkable. This water may be distilled if you have the time and equipment to do so. Two major concerns are the corrosive effects this terrain has on clothing, shoes, and skin, and the large number of biting insects it supports.

Ingredients for Survival

Water. Regardless of your circumstances your foremost concern should be where to obtain water. Almost any environment has at least some water; however, getting it may be a trick. Some of the most common places are: at the first depression behind a sand dune, wherever you find green vegetation, in natural cisterns found in rocky areas, at the concave curves in river beds, wherever you find damp sand, extracted from cacti and other vegetation, or as condensation on objects.

If you have the materials available you may want to build a solar still with which to collect water:

1. Using a large plastic bag (black is better than clear because it will absorb more heat) "scoop" air into the bag by turning the opening into the breeze.

2. Fill the bag approximately three quarters full with nonpoisonous vegetation, making sure points and spines do not puncture the bag.

3. Place a small smooth stone in the bag to weight it down.

4. Close the bag by tying as close to the end as possible, thus ensuring the maximum amount of air space. If you have plastic tubing it may be inserted into the bag and tied off so that the air in the bag does not escape. This allows you to obtain the condensed water without opening the bag.

5. Place the bag, mouth down on an incline in full sunlight. The mouth of the bag should be slightly higher than the lowest point in the bag.

6. Settle the bag in place so that the rock works itself into the lowest point in the bag.

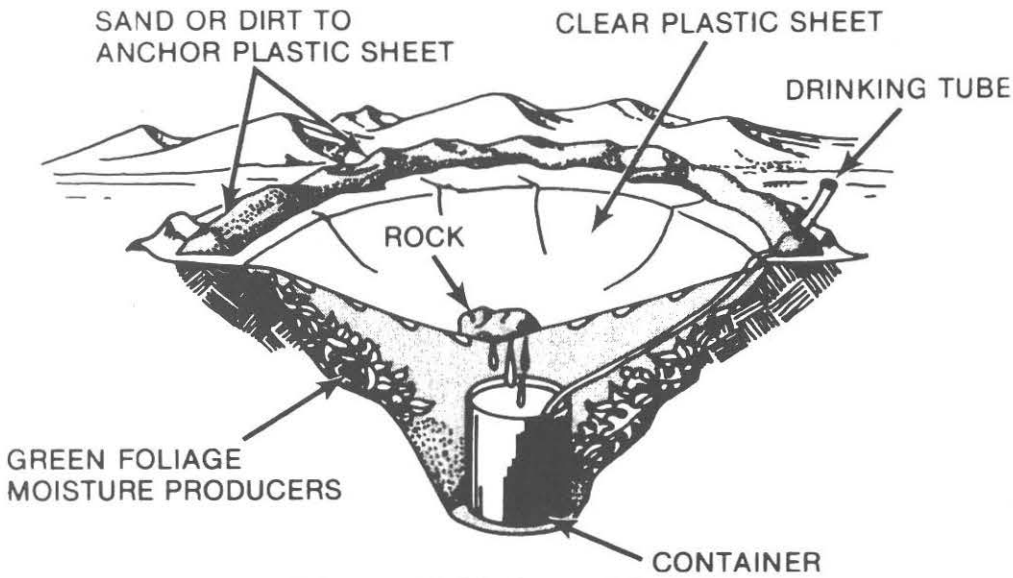
7. To get the extracted water, either untie the plastic tubing and suck it out, or untie the bag and drain it out. Retie the bag and reposition it to allow for further condensation. When the vegetation has released all its moisture, replace it with new plant material.

A below ground still takes more material and requires an expenditure of body moisture to build so it must be done at night. Construction of such a still is as follows:

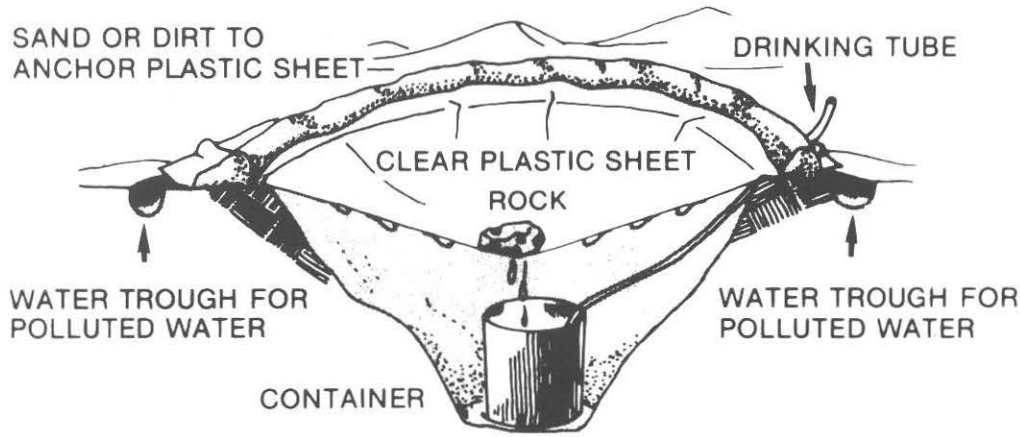
1. Select a site such as a stream bed or a low spot where rainwater has collected in the past. The soil should contain moisture and be where sunlight will hit most of the day.

2. Dig a bowl-shaped hole approximately 3 feet across and 2 feet deep.

3. Dig a sump in the center of the hole. The depth and perimeter of the sump will depend on the size container that you have to set in it. The bottom of the sump should allow the container



Below ground still using vegetation as a moisture source



Below ground still for obtaining water from polluted source

to stand upright.

4. Anchor the tubing to the bottom of the container by forming a loose overhand knot in the tubing.

5. Place the container upright in the sump.

6. Extend the unanchored end of the tubing up, over, and beyond the lip of the hole.

7. Place plastic sheeting over the hole, covering the edges with soil to hold it in place.

8. Place a rock in the center of the plastic.

9. Allow the plastic to lower into the hole until it is about 15 inches below the ground level. The plastic now forms an inverted cone with the rock as its apex. Make sure the apex of the cone is directly over your container. Also make sure the plastic cone does not touch the sides of the hole because the earth will absorb the condensed water.

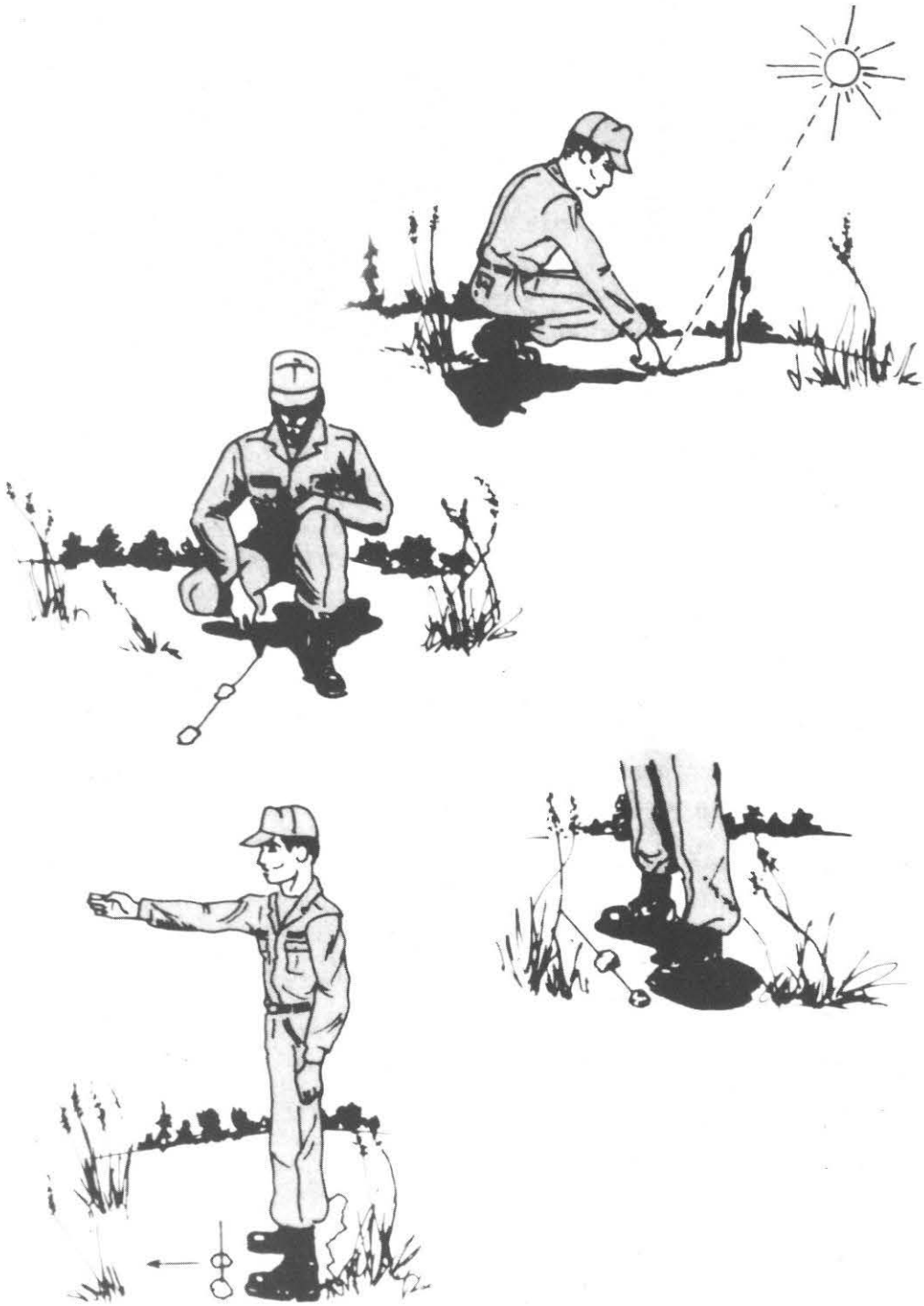
10. Plug the drinking tube when not being used so that moisture will not evaporate.

11. If you are using this with green vegetation, dig the sides of the hole slightly larger to make space for the plant matter.

12. If you are using polluted water, dig a small trough outside the hole about 10 inches away from the lip of your still. Dig this trough 10 inches deep and 3 inches wide. Pour the polluted water into the trough. Be sure not to spill any around the rim of your hole where the plastic touches the soil.The purpose of the trough is to hold the polluted water so that the soil will filter it as it draws into the still. This water then condenses on the plastic and drains into the container. This process works extremely well when your only water source is salt water.

Shelter. A below ground shelter reduces the midday heat as much as 30-40 degrees. Building one, however, requires more time and effort than building other types of shelters. Since

Shadow-Tip Method for Determining Direction



- **Stand with your left foot on the first mark and your right foot on the end of the line you drew.**

your physical effort will make you sweat more, increasing dehydration, you should wait until the cool of night to make it:

1. Find a low spot or depression between dunes or rocks, or, if necessary, dig a trench 18-24 inches deep and long and wide enough for you to lie down comfortably.

2. Pile the sand you take from the trench around three sides to form a mound.

3. On the open end of the trench, dig out more sand so you can get in and out of your shelter easily.

4. Cover the trench with material, such as a parachute, poncho, or canvas.

5. Secure the material in place using sand, rocks, or other weights.

6. If you have extra material you can further decrease the midday temperature in the trench by securing the material 12-18 inches above the other cover. This layering of material will reduce the inside temperature 20-40 degrees.

Direction Finding. Although there are several methods one can use to determine direction, results are more or less general in nature. The more familiar you are with the terrain and its prominent features and landmarks the more successful you will be in determining true directions.

The two methods described below combined with a working knowledge of the terrain will be very helpful for determining direction. You must know which temperate zone you are in when using these methods as the steps taken for each zone are slightly different. The northern temperate zone is located between 23° 4′ north and 66° 6′ north. The southern temperate zone is located between 23° 4′ south and 66° 6′ south.

Because the sun rises in the east and sets in the west, you may want to use the **shadow-tip method.**

1. Find a straight stick or similar object about 3 feet long and fairly straight. Brush free a fairly level spot so that the stick will cast a definite shadow.

2. Push the stick in the ground so that it stands upright. It need not be perfectly vertical to the ground.

3. Mark the tip of the shadow cast by the stick.

4. Wait until the shadow moves 1½-2 inches (approximately 10-15 minutes).

5. Mark the tip of the second shadow.

6. Draw a line from the first mark through and about a foot beyond the second mark.

7. Stand with your left foot on the first mark and your right foot on the end of the line you drew. If you are in the *northern* temperate zone, you will be facing a *northerly* direction. If you are in the *southern* temperate zone, you will be facing a *southerly* direction.

With the **watch method** you can use a conventional watch, one with hands on the face. If your watch is set on daylight savings time, then use the midway point between the hour hand and 1 o'clock to draw your imaginary line.

Northern temperate zone technique:

1. Place a small stick in the ground so that it casts a definite shadow.

2. Place your watch on the ground so that the hour hand points toward and along the shadow of the stick.

3. Find the point on the watch midway between the hour hand and 12 o'clock and draw an imaginary line from that point through and beyond the center of the watch. This imaginary line is a north-south line.

Southern temperate zone technique:

1. Place a small stick in the ground so that it casts a definite shadow.

2. Place your watch on the ground so that 12 o'clock points to and along the shadow.

3. Find the midway point between the hour hand and 12 o'clock and draw an imaginary line from the point through and beyond the center of the watch. This is the north-south line.

Food. Finding food is far less important than finding water. If plenty of food and water existed an individual would fall more toward the lost end of the scale than they would the survival end. In any survival situation in which you have limited water you must weigh the physiological and energy cost of finding and digesting food. Digestion requires water, as does the movement required to gather food.

An individual can survive much longer without food than without water. If you do happen to be in a locale where food is available, possible choices would be: cactus and cactus fruits, new young pads of cactus, nuts such as those of the jojoba shrub, flower blossoms, grubs, and any of the many wild beans. *Do not eat anything you are not sure of.*

Desert survival training must not be taken lightly. The aforementioned items represent only a very small portion of *basic* knowledge our personnel need prior to entering the desert environment. A working knowledge of these desert survival techniques may be more important in terms of confidence than the best equipment in the world. For those seeking additional information I can be reached at Autovon 294-1277 or Commercial (202) 653-1277.

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PFTs

I feel it was an insult to naval medical personnel to have printed the article "Medical Coverage of the Physical Readiness Test" (May-June 1990). LT Strand is obviously not in tune with the staffing of branch medical clinics and ships throughout the fleet. My favorite line is "No fewer than seven hospital corpsmen with EMT certification be stationed around the track."

I am currently a hospital corpsman stationed on NAS North Island. Prior to Operation Desert Shield, the best staffing we have ever achieved was a 40 percent manning percentage. The clinic is also stressed to the point that we can barely meet the EMT needs of our ambulance crews. Meeting your recommendations is not only impossible, it would be irresponsible.

NAS North Island is the host to many shore-based and deployable Airwing commands. On any given day there may be as many as three PFTs. To pull that many HMs, never mind the MD and RN "floaters," would close down services that have been already strained.

This is not an isolated situation. Being part of CVW-15, I work closely with HMs assigned to NASs all along the west coast. These corpsmen discuss the same personnel shortages that I have mentioned. In comparison to some bases, we may be better staffed than the other commands.

I do agree that medical should be actively involved in safeguarding PFT participants, and the system that we employ could be improved. Improvement should be carefully studied and balanced so medical services are not detrimentally altered or staffing dangerously stretched.

In general, the article appears well researched. The credibility of LT Strand's article is greatly diminished by his selected recommendations and some parts of his PRT checklist. Real fleet deployment schedules do not coincide with his article. In the future, I hope to read more articles about medical personnel usage designed to safeguard sailors participating in PFTs. The articles should be ones we can use as guidelines vs. impractical dreams.

HM2 W. MacMillan, AVT

Ivy Letter

I am writing in reference to LT M.E. Ivy's letter published in the May-June 1990 issue. I find Dr. Ivy very perceptive. His remarks echo the same statements senior hospital corpsmen have been making for several years now.

At this time there are very few senior hospital corpsmen with any combat/mass casualty experience still on active duty. Those that do remain on active duty are likely to be found aboard ship, as it has been an unspoken prerequisite that one must possess the Navy Enlisted Classification Code of HM-8425 for promotion. Those senior hospital corpsmen assigned to the Fleet Marine Force (FMF) may be excellent administrators or instructors, but lack the firsthand experience necessary to train our young and upcoming successors. My experiences as a hospital corpsman were molded by the senior hospital corpsmen I worked for. They were the ones who taught me the skills and morals necessary to be the successful hospital corpsman I am today.

Dr. Ivy states that "too many corpsmen come to the FMF ready to be nurse's aides." While having extreme difficulty swallowing this information, I must, for it is shamefully true. Closer to the truth is the fact that many of our hospital corpsmen would not make very good nurse's aides in the civilian community. The blame for this condition can and should be spread throughout the naval medical community, doctors, nurses, MSCs, and the Hospital Corps.

Today's Battalion Surgeon, his Battalion Chief, and the remaining senior petty officers are responsible, both militarily and morally, to prepare the battalion hospital corpsmen for the increased responsibilities he must assume when "the balloon goes up." Perhaps it's time for the Battalion Surgeon to give up some of his time at the naval hospital and spend it with his troops. The Battalion Chief could easily pass some of the administrative duties to his First Class and spend that time passing on his vast knowledge.

Finally, in a time when most HM-8404s feel that their skills are not appreciated in Navy medicine, it is extremely comforting to hear a Medical Corps officer stress to his peers the fact that "they will depend heavily upon the corpsmen." Semper Fi "Doc" Ivy.

HM1 K. Gerber

Boots

I read with interest the article entitled "Boot Design, Sizing, and Foot Disorders in Reservists Undergoing Field Training" by CDR Neil Rheiner and CAPT William Gondring that appeared in your July-August 1990 issue. While I think that these gentlemen have explored an important area in a scholarly way, I am tremendously concerned about their statistical analysis and the impact that it has had on the presentation of their results.

First, in Table 2, information that is labeled as Pearson Correlation Coefficients appear to be the actual p-values. This is indicated by the following:

(1) The coefficients are all less than or equal to 0.05, values so close to zero as to cast serious doubts as to the strength of the relationship between the variables.

(2) If a coefficient as small as these *were* significant, then any coefficient *larger* than 0.05 would be even more significant, and a value of 1.00 (as occurs where the variable "running" overlaps itself) would most certainly be significant at the 0.000 level.

Second, Pearson was *not* the appropriate correlation coefficient for these data. All variables appear to be discrete

(that is, Yes or No) and as such, should be analyzed by a nonparametric statistic such as a contingency coefficient or a Spearman rank correlation coefficient. It is possible that these statistics would have given a far clearer picture of the interactions among the variables, and strengthened the author's results.

Third, the authors would have probably been better off had they used Fisher's Exact Test to analyze the relationship among the variables. Especially since they had 335 subjects, the chances of finding more significant differences and easily interpretable findings from this statistic are great.

Fourth, it *is* possible to determine an exact percentage of people who receive the correct boot size, if females ordering by the incorrect method are eliminated from the calculation. However, I think the authors may have missed the significance of finding that females used two different methods for ordering boots. Clearly, whatever forms are used to select boot size need to be changed to emphasize the correct method for women.

Finally, it would appear that there could be a problem for this publication as well. The errors in the article are large enough to be embarrassing, not only for the authors, but for *Navy Medicine* and those associated with it. There are two possible remedies for this. All research involving human subjects *must* go through a rigorous examination before a Scientific Review Committee and a Committee for the Protection of Human Subjects. This process is overseen by the Clinical Investigations Program and the Health Sciences Education and Training Command, and should screen for errors in proposed statistical analysis. Requesting from authors that they submit a copy of the letter giving approval for their research would safeguard your publication. The other remedy would be to send submissions such as this to a biostatistician for review.

Thank you for considering the above information. I want to stress that I think the authors have a good study, but that they should reanalyze their data.

C.B. Philput, Ph.D.
Naval Hospital, Portsmouth, VA

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Members of the first graduating class of the Hospital Corps of Instruction, Norfolk, VA, participate in a disaster drill in the field.

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